UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROGER PATRICK and PHILLIP L. JONES

Appeal No. 2005-0537
Application No. 08/925,985

ON BRIEF

Before KRATZ, JEFFREY T. SMITH, and PAWLIKOWSKI, Administrative Patent Judges.
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1, 2, 4-10 and 25-33, which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a method of etching a substrate in a plasma processing chamber using a sacrificial substrate holder for allegedly obtaining improved etch uniformity. A further understanding of the invention may be obtained by a reading of appealed claim 1, which is reproduced below.

1. In a plasma processing chamber, a method for improving etch uniformity while etching a semiconductor substrate, comprising:

placing said semiconductor substrate into a sacrificial substrate holder, said sacrificial substrate holder being configured to present a sacrificial etch portion surrounding said semiconductor substrate to a plasma within said plasma processing chamber to permit said plasma to etch a first surface of said semiconductor substrate and a first surface of said sacrificial etch portion simultaneously, said first surface of said sacrificial etch portion being formed of a pure metallic material capable of being etched by said plasma and configured to be parallel with said first surface of said semiconductor substrate;

positioning said semiconductor substrate and said sacrificial substrate holder into said plasma processing chamber;

striking said plasma from an etchant source gas released into said plasma processing chamber; and

simultaneously etching said first surface of said semiconductor and said first surface of said sacrificial etch portion using said plasma.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Zhao et al. (Zhao)	5,558,717	Sep. 24, 1996
Hills et al. (Hills)	5,685,914	Nov. 11, 1997 (Filed Apr. 05, 1994)
Abraham	5,772,906	Jun. 30, 1998 (Filed May 30, 1996)
Ye et al. (Ye)	5,891,348	Apr. 06, 1999 (Filed Jan 26, 1996)
Abraham et al.	5,952,244	Sep. 14, 1999 (Filed Feb. 15, 1996)
Rossman et al. (Rossman)	6,077,357	Jun. 20, 2000 (Filed May 29, 1997)
Bhan et al. (Bhan)	6,090,167	Jul. 18, 2000

		(Filed Oct. 06, 1999)[1]
Shamouilian et al. (Shamouilian)	6,095,084	Aug. 01, 2000
		(Filed Jul. 14, 1997)
Kao et al. (Kao)	6,125,859	Oct. 03, 2000
		(Filed Jul. 11, 1997)

Claims 1, 2, 4-10, 25 and 29-33 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as invention. Claims 1, 2, 4-10, 25, 29-31 and 33 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Ye. Claim 32 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ye. Claims 1, 2, 7, 25, 31 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hills in view of Shamouilian, Kao, Zhao, Bhan, Rossman and Ye. Claims 4-6, 8-10, 26-30 and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hills in view of Shamouilian, Kao, Zhao, Bhan, Rossman, Ye, Abraham and Abraham et al.

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[1] Division of application No. 08/616,707 filed on March 15, 1996 and now U.S. Patent No. 6,001,728. Appellants do not challenge the prior art status of Bhan based on the prior effective filing date of the earlier application.

We refer to the brief and reply brief and to the answer for an exposition of the opposing viewpoints expressed by appellants and the examiner concerning the issues before us in this appeal.

DECISION

We shall sustain the examiner's § 112, second paragraph rejection. In addition, we introduce a new ground of rejection of claims 26-28 and 32 as failing to comply with the second paragraph of 35 U.S.C. § 112, on this record. Moreover, since we can not ascertain the scope of the claims before us on this record, we procedurally reverse the § 102 and § 103 rejections advanced by the examiner.[2] Our reasoning follows.

A principal purpose of the second paragraph of § 112 is to provide those who would endeavor, in future enterprises, to approach the area circumscribed by the claims of a patent, with adequate notice demanded by due process of law, so that they may more readily and accurately determine the boundaries of protection involved and evaluate the possibility of infringement and dominance. See In re Hammack, 427 F.2d 1378, 1382, 166 USPQ 204, 208 (CCPA 1970).

[2] We emphasize that this reversal is a technical reversal rather than one based on the merits.

As the court stated in In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971), the determination of whether the claims of an application satisfy the requirements of the second paragraph of Section 112 is

> merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. It is here where the definiteness of language employed must be analyzed -- not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art. [Footnote omitted.]

In order to satisfy the requirements of the second paragraph of § 112, a claim must accurately define the invention in the technical sense. See In re Knowlton, 481 F.2d 1357, 1366, 178 USPQ 486, 492-93 (CCPA 1973).

Applying these principles to the present case, we agree with the examiner that the "pure" and "substantially pure" language as used in the appealed claims introduces uncertainty and inconsistency which would preclude one skilled in the art from determining the metes and bounds of the claimed subject matter.

With respect to the rejection under the second paragraph of § 112, appellants furnish three groups of claims and state that the appealed claims of each such group stand or fall together

(brief, page 4).[3] Consequently, we select claims 1, 4 and 25 as the representative claims for our consideration of that ground of rejection with respect to appellants' claim groups I, II, and IV, respectively. See 37 CFR § 1.192 (c)(7 and 8)(2000). Also, appealed claim 9 (labeled as claim group III by appellants) and appealed claim 30 (labeled as claim group VI by appellants) are each separately argued with respect to the examiner's rejection of the appealed claims under the second paragraph of 35 U.S.C. § 112.

Concerning representative claims 1 and 25, the examiner asserts that the terms "pure metallic material" and "substantially pure metallic planar upper surface" as respectively used in those representative claims represent relative terms of undeterminable scope to one of ordinary skill in the art given that no standard for assessing the meets and bounds thereof has been furnished by appellants. See page 5 of the answer.

Appellants, on the other hand, maintain that one of ordinary skill in the art would understand the scope of the representative

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[3] Appellants' group I includes claims 1, 2, 7, 8 and 10, appellants' group II includes claims 4-6, and appellants' group IV includes claims 25, 29 and 31-33.

claims not withstanding the use of the above-noted terms therein. However, appellants do not point to any particular definition or standard provided in their specification for those terms or provide other evidence of a known industry standard that those of ordinary skill in the art would have readily recognized as being understood as representing the definition of "pure" and "substantially pure" in the context of the appealed method claims before us. Rather, in the reply brief filed September 27, 2004, appellants refer to two particular dictionary definitions of the term "pure" in Webster's New World Dictionary, Third College Edition (1994) wherein the term "pure" is reportedly defined as "free from an adulterant" or "unmixed." Thus, in support of their argued definiteness position, appellants seemingly urge that the term "pure" as used in the context of representative claim 1 would be understood by one of ordinary skill in the art to require a metallic material that is either unmixed or free from an adulterant. Similarly, with regard to representative claim 25, appellants maintain that the "substantially pure metallic planar upper surface" language in question would be understood by one of ordinary skill in the art as requiring a metallic planar upper surface that is unmixed or substantially free of an adulterant. Likewise, concerning representative claim

4, appellants maintain that the "pure aluminum" language at issue is not indefinite for similar reasons.

We are not persuaded by those arguments and inconsistent dictionary definitions furnished by appellants. Indeed, rather than clarifying the ambiguous claim language at issue, appellants' arguments and cited dictionary definition(s) serve to highlight the indistinctness of the terms "pure" and "substantially pure" as used in the rejected claims. Concerning this matter, we note that the term "purity, chemical" is described in the ninth edition of The Condensed Chemical Dictionary by referring to previously recognized purity standards or grades, specifications for which have been established by a recognized standard setting organization.[4] Here, as noted above, appellants have not established that the term "pure" as used in the claims before us denotes a particular industry recognized grade of purity. This is especially the case for representative claims 1 and 25 because it is not clear what industry standard could possibly exist for the term "metallic" that follows "pure" in those claims. In this regard, any material that contains some

[4] See the definitions of "grade" and "purity, chemical" in The Condensed Chemical Dictionary, Coauthored and Co-edited by Gessner G. Hawley (Ninth Ed. (1977), pp. 421 and 732.

metal or a metal compound may be considered to be a metallic material. How one of ordinary skill in the art would grade purity of metallic materials or differentiate a pure from an impure metallic material is not developed on this record. Moreover, as far as representative claim 4 is concerned, no numeric value(s) or other clear definition for determining what characteristic minimum weight percent or volume of aluminum is required in a material such that the material is a "pure aluminum" has been established on this record. As we pointed out above, the evidence of record does not reflect that one of ordinary skill in the art would understand that the term "pure aluminum" connotes a material having a certain weight percent aluminum content. Similarly, with regard to claims 9 and 31, the term "99.999% pure aluminum" does not clearly furnish a definition of purity. Rather, the term employed in those claims raises further issues because it is not clear what the percent value employed in those claims represents when it is followed by the term "pure aluminum." For example, if we were to speculate that appellants intended to use a definition of "pure" as meaning "free from an adulterant," and were we to speculate that the 99.999% value employed in claim 9 represented a weight percent value, then we would understand that claim would require use of a

material, 99.999 weight percent of which comprises aluminum free from an adulterant. Then, we would need to assess what materials would be considered adulterants in the context of the claimed subject matter. Of course, that would also require some speculation because a list of adulterants has not been furnished by appellants in their specification.[5] The need for such speculation upon speculation in assessing the scope of the claims underscores the indefiniteness thereof.

Concerning our new ground of rejection of claims 26-28 and 32, pursuant to 37 CFR § 41.50(b), as failing to comply with the second paragraph of 35 U.S.C. § 112 on this record, we agree with the examiner and appellants that the transitional phrase "consisting essentially of" as employed in those claims limits those claims to an upper surface that is made of aluminum alone or together with any other material that does not materially effect the basic and novel characteristics of the aluminum-containing upper surface. Turning to appellants' specification for guidance so as to determine what those basic and novel characteristics are, we find that appellants describe the

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[5] See, e.g., the various definitions of "adulterate," "metallic" and "pure" at pages 17 and 764 and 983 of The American College Dictionary (1970).

inventive material from which the surface is made as being one which is "capable of being etched away with the plasma cloud while causing relatively little contamination and/or leaving relatively little residue" (appellants' specification, page 10, lines 14 and 15). Given that disclosure in appellants' specification, we find claims 26-28 and 32 indefinite in that the basic and novel characteristic of leaving relatively little contamination and/or relatively little residue while etching is not set forth with any standard for one of ordinary skill in the art to determine how much residue or contamination is meant by "relatively little."

Given that the record reflects that the terms "pure," "substantially pure," "99.999% pure" and "consisting essentially of aluminum" may be interpreted in a number of ways on this record and that the specification provides little help in determining the metes and bounds of the claimed subject matter, we determine that the claims before us are in violation of the requirements of the second paragraph of 35 U.S.C. § 112.

In this regard, we note that a potential competitor may have no way of determining whether a substrate holder formed of a particular metallic or aluminum-containing material represents a holder that includes sufficient other materials or adulterants

such that the holder would not infringe appellants' claims when the claims are construed in light of the present application specification.

Consequently, we sustain the examiner's 35 U.S.C. § 112, second paragraph rejection and make the above-noted new ground of rejection of claims 26-28 and 32.

For reasons stated infra, we cannot determine the scope of the claims on appeal. As the court in In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)(CCPA 1970) stated:

> All words in a claim must be considered in judging the patentability of that claim against the prior art. If no reasonably definite meaning can be ascribed to certain terms in the claim, the subject matter does not become obvious--the claim becomes indefinite.

In comparing the claimed subject matter with the applied prior art, it is apparent to us that considerable speculations and assumptions are necessary in order to determine the propriety of the §§ 102 and 103 rejections of record since it cannot be ascertained what in fact is being claimed. Since the propriety of the examiner's rejections under Section 102 and/or 103 cannot be determined based on speculations and assumptions, see In re Steele, 305 F.2d 859, 862-63, 134 USPQ 292, 295-96 (CCPA 1962),

we are constrained to reverse the examiner's §§ 102 and 103 rejections. We hasten to add that this is a technical reversal rather than one based upon the merits of the Section 102 and/or 103 rejections.

CONCLUSION

The decision of the examiner to reject claims 1, 2, 4-10, 25 and 29-33 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as invention is affirmed. The decision of the examiner to reject claims 1, 2, 4-10, 25, 29-31 and 33 under 35 U.S.C. § 102(e) as being anticipated by Ye; to reject claim 32 under 35 U.S.C. § 103(a) as being unpatentable over Ye; to reject claims 1, 2, 7, 25, 31 and 33 under 35 U.S.C. § 103(a) as being unpatentable over Hills in view of Shamouilian, Kao, Zhao, Bhan, Rossman and Ye; and to reject claims 4-6, 8-10, 26-30 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Hills in view of Shamouilian, Kao, Zhao, Bhan, Rossman, Ye, Abraham and Abraham et al is reversed.

A new ground of rejection of claims 26-28 and 32 under 35 U.S.C. § 112, second paragraph has been made.

Regarding the affirmed rejection, 37 CFR § 41.52(a)(1) provides "[a]ppellant may file a single request for rehearing within two months from the date of the original decision of the Board."

In addition to affirming the examiner's rejection(s) of one or more claims, this opinion contains a new ground of rejection pursuant to 37 CFR § 41.50(b) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)). 37 CFR § 41.50(b) provides "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review."

37 CFR § 41.50(b) also provides that appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner . . . .
>
> (2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record . . . .

Should appellants elect to prosecute further before the examiner pursuant to 37 CFR § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If appellant elects prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART; 37 CFR § 41.50(b)

PETER F. KRATZ
Administrative Patent Judge

JEFFREY T. SMITH
Administrative Patent Judge

BEVERLY A. PAWLIKOWSKI
Administrative Patent Judge

) BOARD OF PATENT APPEALS AND INTERFERENCES

PFK/sld

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The Condensed Chemical Dictionary

NINTH EDITION

Revised by

GESSNER G. HAWLEY

Coeditor, Encyclopedia of Chemistry
Coauthor, Glossary of Chemical Terms

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gold sodium cyanide. See sodium gold cyanide.

gold sodium thiomalate
$NaOOCCH(SAu)CH_2COONa \cdot H_2O$.
Properties: White to yellowish-white, odorless powder with metallic taste; affected by light. Very soluble in water; practically insoluble in alcohol and ether. Aqueous solutions are colorless to pale yellow; pH (5% solution) 5.8–6.5.
Derivation: Reaction of sodium thiomalate with a gold halide.
Grade: U.S.P.
Use: Medicine.

gold sodium thiosulfate. See sodium gold thiosulfate.

gold solder. A solder usually composed of gold, silver, copper, zinc, or brass; used principally by jewelers.

gold thioglucose. See aurothioglucose.

gold tin precipitate. See gold tin purple.

gold tin purple (purple of Cassius; gold tin precipitate).
Properties: Brown powder. Insoluble in water; soluble in ammonia.
Derivation: By the reaction of a neutral solution of gold trichloride with stannous and stannic chlorides, yielding a mixture of colloidal gold and tin oxide in varying proportions.
Grade: Technical.
Containers: Tins; glass bottles.
Uses: Manufacture of ruby glass; coloring enamels; painting porcelain.

gold tribromide (auric bromide; gold bromide) $AuBr_3$.
Properties: Brownish-black powder; m.p. 160°C, with decomposition. Soluble in alcohol, ether; slightly soluble in water.
Uses: Analysis (testing for alkaloids, spermatic fluid); medicine.

gold tribromide, acid. See bromoauric acid.

gold trichloride (a) $AuCl_3$ (auric chloride; gold chloride); (b) $AuCl_3 \cdot 2H_2O$; (c) $AuCl_2 \cdot HCl \cdot 4H_2O$ or $HAuCl_4 \cdot 4H_2$ (chlorauric acid; chloroauric acid; gold trichloride, acid).
Properties: Yellow to red crystals; decomposed by heat; soluble in water, alcohol and ether.
Derivation: Action of aqua regia on gold.
Grades: Technical; C.P., usually as chlorauric acid.
Uses: Photography; gold plating; special inks; medicine; ceramics (enamels, gilding and painting porcelain); glass (gilding, ruby glass); manufacture of finely divided gold and purple of Cassius.

gold trioxide. See gold oxide.

gold, white. A jeweler's alloy consisting of about 58% gold, 17% nickel, 7% zinc and 17% copper.

Goodyear, Charles (1800–1860). Born in Woburn, Mass., Goodyear was the first to realize the potentialities of natural rubber Frustrated by its lack of stability to temperature and other weaknesses in the uncured state, he experimented with additives such as magnesium and sulfur. The discovery of vulcanization was not accidental, as is often stated, but the result of intelligent trials and correct evaluation of their results. Though Goodyear's patents were contested by Hancock in England, he well merits the credit for making rubber usable in countless ways, and helping to make the automobile possible.

gossypol. $C_{30}H_{30}O_8$. A natural polyphenol.
Properties: Yellow, crystalline pigment, having three modifications. Insoluble in water; soluble in alcohol.
Occurrence: Cottonseed kernels.
Hazard: Toxic by ingestion; but is inactivated by heat; 0.04% max. allowed in foods.
Uses: Stabilizer for vinyl polymers; has possibilities as a biodegradable insecticide.

GPF black. Abbreviation for general purpose furnace black. See carbon black.

grade. Any of a number of purity standards for chemicals and chemical products established by various specifications. Some of these grades are as follows:

ACS (American Chemical Society specifications)
reagent (analytical reagent quality)
C.P. (chemically pure)
USP (conforms to U.S. Pharmacopeia specifications)
N.F. (conforms to National Formulary specifications)
purified
FCC (Food Chemicals Codex specifications)
technical (industrial chemicals)

food	spectro
feed	commercial
semiconductor	chemical
radio	injectable
research	nitration

"Grafoil."[521] Trademark for pure flexible graphite tape with highly directional properties similar to pyrolytic graphite. Thermal insulating properties up to 6600°F.

grafting. A deposition technique whereby organic polymers can be bonded to a wide variety of other materials, both organic and inorganic, in the form of fibers, films, chips, particles, or other shapes. Grafting occurs at specific catalyst sites on the "host" materials, which must have some capacity for ion exchange, methathesis, or complex formation. Ionizable groups may be added artificially.

One proprietary application is polymerization of acrylonitrile with wood pulp fibers to make synthetic soil blocks; the polymer imparts high water-holding capacity to the pulp. Plant nutrient materials are added, and the mixture pressed into blocks to be used for starting seedlings.

graft polymer. A copolymer molecule comprised of a main backbone chain, to which side chains containing different atomic constituents are attached at various points. The main chain may be either a homopolymer or a copolymer. This process may be applied to the union of cellulosic molecules (cotton, rayon) with synthetic polymers (except polyesters, acrylics, and polypropylene) to form modified fibers having improved flame resistance, dimensional stability, resilience, and bacterial resistance. An intermediate called cellulose thiocarbonate (q.v.) is formed in this proprietary process.
See also polyorganosilicate graft polymer.

used for wrapping, packaging, container board, etc. A relatively new process called holopulping replaces sodium sulfate with oxidants. A synthetic pulp based on polyolefins (styrene copolymer fibers) has been developed to the production stage in Japan. See also holopulping; paper; digestion.

pumice. A highly porous igneous rock, usually containing 67–75% SiO_2 and 10–20% Al_2O_3; glassy texture. Potassium, sodium, and calcium are generally present. Insoluble in water; not attacked by acids.
Occurrence: Arizona, Oregon, California, Hawaii, New Mexico; Italy; New Zealand, Greece.
Grades: Lump; powdered coarse, medium, fine; N.F.; technical.
Containers: Bags; ton lots.
Uses: Concrete aggregate; heat and sound insulation; filtration; finishing glass and plastics; road construction; scouring preparations; paint fillers; absorbents; support for catalysts; dental abrasive; abherent for uncured rubber products.

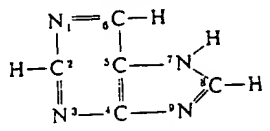
"Purafil."[525] Trademark for an odoroxidant consisting of activated alumina impregnated with potassium permanganate in pellet form. Destroys odors by oxidation.

"Purecal."[203] Trademark for a series of calcium carbonates produced by a special precipitation process which results in finer particles of cubical shape.
Uses: Coating fine paper stocks; filler in rubber and plastics; extender for paints, printing inks; filler in dentifrices, cosmetics, pharmaceuticals; neutralizing agent in preparation of antibiotics; insecticide carrier; enamel-color extender in ceramics; calcium enrichment of food products.

purification. Removal of extraneous materials (impurities) from a substance or mixture by one or more separation techniques. A pure substance is one in which no impurity can be detected by any experimental procedure. Though absolute purity is impossible to attain, a number of standard procedures exist for approaching it to the extent of 1 part per million of impurity. The following fractionation techniques are widely used: crystallization, precipitation, distillation, adsorption (various types of chromatography), extraction, electrophoresis, and thermal diffusion. See also purity, chemical.

"Purifloc."[233] Trademark for a polyelectrolyte (q.v.) used to flocculate solids in water and industrial waste treatment.

purine (1) [imidazo (4,5-d) pyrimidine]



Properties: Colorless crystals; m.p. 217°C; soluble in water, alcohol, toluene; slightly soluble in ether.
Derivation: Prepared from uric acid and regarded as the parent substance for compounds of the uric group, many of which occur naturally in animal waste products.
Uses: Organic synthesis; metabolism and biochemical research.

(2) One of a number of basic compounds found in living matter and having a purine-type molecular structure. See adenine, guanine, hypoxanthine, xanthine, uric acid, caffeine, and theobromine.

"Purinethol."[301] Trademark for 6-mercaptopurine (q.v.).

"Purite."[64] Trademark for a specially prepared fused soda ash furnished in the form of two-pound cast pigs and stated to contain over 98% sodium carbonate.
Uses: Cupola flux; refining and desulfuring iron, steel and other metals.

purity, chemical. A substance is said to be pure when its physical and chemical properties coincide with those previously established and recorded in the literature, and when no change in these properties occurs after application of the most selective fractionation techniques. In other words, purity exists when no impurity can be detected by any experimental procedure. There are a number of recognized standards of purity. See also grade.

"Purodigin."[24] Trademark for digitoxin (q.v.).

puromycin (USAN) $C_{22}H_{29}N_7O_5$. Crystals; m.p. 176°C. An antibiotic which inhibits protein synthesis, prevents transfer of amino acid from its carrier to the growing protein. Produced by Streptomyces alboniger; effective against bacteria, protozoa, parasitic worms, and cancerous tumors. Toxic to living cells of all kinds.

purple of Cassius. See gold-tin purple.

purpurin (1,2,4-trihydroxyanthraquinone) $C_{14}H_5O_2(OH)_3$.
Properties: Reddish needles; m.p. 256°C; slightly soluble in hot water; soluble in alcohol and ether.
Derivation: Occurs as a glucoside in madder root. Made synthetically by oxidation of alizarin.
Uses: Dye for cotton; stain for microscopy; reagent for calcium.

purpurin red. See anthrapurpurin.

"Purzaust."[418] Trademark for a catalytic converter developed for the removal of air pollutants normally present in exhaust gases from internal combustion engines. A fixed bed of solid catalyst promotes oxidation of combustible pollutants to carbon dioxide and water.

"PuTrol."[188] Trademark for a powerful aromatic compound used for masking the odors of putrefaction associated with the decomposition of proteins, as in fat-rendering operations, sewage disposal, and industrial wastes.

putty. A mixture of whiting (chalk) with from 12 to 18% of inseed oil, with or without white lead or other pigment. Containers must be air-tight.
Uses: Sealant; glass setting; caulking agent.

putty powder. A soft abrasive composed of tin oxide.

PVA. Abbreviation for polyvinyl alcohol.

PVAc. Abbreviation for polyvinyl acetate.

PVB. Abbreviation for polyvinyl butyral.

PVC. Abbreviation for (1) polyvinyl chloride, and (2) pigment volume concentration, a term used in paint technology to mean pigment volume divided by the sum of the pigment volume and the vehicle solids volume, multiplied by 100.

PVdC. See polyvinyl dichloride.

PVE. Abbreviation for polyvinyl ethyl ether.

PVI. Abbreviation for polyvinylisobutyl ether.

PVM. Abbreviation for polyvinyl methyl ether.

PVM/MA. See polyvinyl methyl ether maleic anhydride.

McGraw-Hill DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS Second Edition

1978

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nated card; for example, in an 80-column card the rows or punch position may be 0 to 9 or X and Y corresponding to positions 11 and 12.

punch press [MECH ENG] 1. A press consisting of a frame in which slides or rams move up and down, of a bed to which the die shoe or bolster plate is attached, and of a source of power to move the slide. Also known as drop press. 2. Any mechanical press.

punch radius [DES ENG] The radius on the bottom end of the punch over which the metal sheet is bent in drawing.

punch tape [ADP] A paper or plastic ribbon in which data may be represented by means of partially or completely punched holes; it generally has one row of small sprocket-feed holes and five, seven, or eight rows of larger data-representing holes. Also known as punched tape.

punch-tape code [ADP] A code used to represent data on punch tape.

punch-through [ELECTR] An emitter-to-collector breakdown which can occur in a junction transistor with very narrow base region at sufficiently high collector voltage when the space-charge layer extends completely across the base region.

punctate [BIOL] Dotted; full of minute points.

punctuation bit [ADP] A binary digit used to indicate the beginning or end of a variable-length record.

punctum remotum *See* far point.

puncture [ELEC] Disruptive discharge through insulation involving a sudden and large increase in current through the insulation due to complete failure under electrostatic stress. [SCI TECH] To pierce or indent.

puncture voltage [ELEC] The voltage at which a test specimen is electrically punctured.

punt [NAV ARCH] 1. A heavily built boat of rectangular shape used by workmen employed in painting, cleaning, or repairing a ship's topsides when in sheltered waters. 2. A square-ended boat used on shallow rivers and lakes, often propelled by poles.

pupa [INV ZOO] The quiescent, intermediate form assumed by an insect that undergoes complete metamorphosis; it follows the larva and precedes the adult stages and is enclosed in a hardened cuticle or a cocoon.

pupate [INV ZOO] 1. To develop into a pupa. 2. To pass through a pupal stage.

pupil [ANAT] The contractile opening in the iris of the vertebrate eye.

pupillary reflex [PHYSIO] 1. Contraction of the pupil in response to stimulation of the retina by light. Also known as Whytt's reflex. 2. Contraction of the pupil on accommodation for close vision, and dilation of the pupil on accommodation for distant vision. 3. Contraction of the pupil on attempted closure of the eye. Also known as Westphal-Pilcz reflex; Westphal's pupillary reflex.

Pupin coil *See* loading coil.

Pupipara [INV ZOO] A section of cyclorrhaphous dipteran insects in the Schizophora series in which the young are born as mature maggots ready to become pupae.

pup jack *See* tip jack.

Puppis [ASTRON] A southern constellation; right ascension 8 hours, declination 40° south. Also known as Stern.

Purbeckian [GEOL] A stage of geologic time in Great Britain: uppermost Jurassic (above Bononian, below Cretaceous).

pure coal *See* vitrain.

pure culture [MICROBIO] A culture that contains cells of one kind, all progeny of a single cell.

pure forest [FOR] A forest in which one species makes up 80% or more of the total number of trees.

pure geometry [MATH] Geometry studied from the standpoint of its axioms and postulates rather than its objects.

pure imaginary number [MATH] A complex number $z = x + iy$, where $x = 0$.

pure mathematics [MATH] The intrinsic study of mathematical structures, with no consideration given as to the utility of the results for practical purposes.

pure projective geometry [MATH] The axiomatic study of geometric systems which exhibit invariance relative to a notion of projection.

pure research *See* basic research.

pure tone *See* simple tone.

pure Trojan group [ASTRON] The group of Trojan planets which lies near the Lagrangian point 60° behind Jupiter. Also known as Patroclus group.

purga [METEOROL] A severe storm similar to the blizzard and buran, which rages in the tundra regions of northern Siberia in winter.

purge date [ADP] The date after which data are released and the storage area can be used for storing other data.

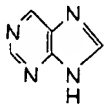
purge meter interlock [MECH ENG] A meter to maintain airflow through a boiler furnace at a specific level for a definite time interval; ensures that the proper air-fuel ratio is achieved prior to ignition.

purging [MED] The condition in which there is rapid and continuous evacuation of the bowels. [SCI TECH] The act or process of cleaning and purifying.

purify [ENG] To remove unwanted constituents from a substance.

purine [BIOCHEM] A heterocyclic compound containing fused pyrimidine and imidazole rings; adenine and guanine are the purine components of nucleic acids and coenzymes.

PURINE



Structural formula of purine.

purity [CHEM] The state of a chemical compound when no impurity can be detected by any experimental method; absolute purity is never reached in practice. [OPTICS] The degree to which a primary color is pure and not mixed with the other two primary colors.

purity coil [ELECTR] A coil mounted on the neck of a color picture tube, used to produce the magnetic field needed for adjusting color purity; the direct current through the coil is adjusted to a value that makes the magnetic field orient the three individual electron beams so each strikes only its assigned color of phosphor dots.

purity control [ELECTR] A potentiometer or rheostat used to adjust the direct current through the purity coil.

purity magnet [ELECTR] An adjustable arrangement of one or more permanent magnets used in place of a purity coil in a color television receiver.

purity of state [STAT MECH] Property of a system which is definitely in a certain quantum state, rather than having a certain probability of being in any of several quantum states.

Purkinje cell [HISTOL] Any of the cells of the cerebral cortex with large, flask-shaped bodies forming a single cell layer between the molecular and granular layers.

Purkinje effect [PHYSIO] When illumination is reduced to a low level, slowly enough to allow adaptation by the eye, the sensation produced by the longer-wave stimuli (red, orange) decreases more rapidly than that produced by shorter-wave stimuli (violet, blue). Also spelled Parkinje effect.

Purkinje fibers [HISTOL] Modified cardiac muscle fibers composing the terminal portion of the conducting system of the heart.

purlin [BUILD] A horizontal roof beam, perpendicular to the trusses or rafters; supports the roofing material or the common rafters.

puromycin [MICROBIO] $C_{22}H_{29}O_5N_7$ A colorless, crystalline broad-spectrum antibiotic produced by a strain of *Streptomyces*.

purple bacteria [MICROBIO] Any of various photosynthetic bacteria that contain bacteriochlorophyll, distinguished by purplish or reddish-brown pigments.

purple blende *See* kermesite.

purple blotch [PL PATH] A fungus disease of onions, garlic, and shallots caused by *Alternaria porri* and characterized by small white spots which become large purplish blotches.

purple boundary [OPTICS] A straight line connecting the ends of the spectrum locus on the chromaticity diagram.

purple lakes [MATER] A class of lake (pigment) used in printing inks; derived from a combination of such compounds as β-hydroxynaphthoic acid and 2-diazonaphthalene-1-sulfonic acid.

purple light [GEOPHYS] The faint purple glow observed on clear days over a large region of the western sky after sunset and over the eastern sky before sunrise.

purple nonsulfur bacteria [MICROBIO] Any of various purple photosynthetic bacteria, especially members of the family Athiorhodaceae, that utilize organic hydrogen donor compounds.

purple of Cassius *See* gold tin purple.